CHAPTER 5

DIALOGIC BRIDGES: VOICES BETWEEN IDEOLOGICAL FRONTIERS

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ABSTRACT

This study proposed a methodology for identifying deputies with the potential to establish a more effective articulation between disparate ideological blocs within a legislative body. This approach was predicated on network analysis. The network under consideration had, as its core, vote agreement among deputies, from which three metrics were calculated: bridge coefficient, betweenness centrality, and bridge centrality. Following a thorough descriptive and statistical analysis of the metrics in question, the 10 deputies with the most bridge centrality were identified. Bridge centrality was a metric that combined global structural influence with the connection between local communities. The study proffered a replicable methodology for identifying, solely on the basis of network structure, agents with a propensity to function as mediators in contexts of political fragmentation. This identification was a critical component of research focused on governability, the formation of coalitions, and the mediation of conflicts within multiparty systems.

KEYWORDS: social network analysis, bridge centrality, legislative agreement, political intermediation, inter-ideological articulation

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1 INTRODUCTION

It is evident that the phenomenon of polarization has become a pervasive element in contemporary political discourse, exerting its influence across diverse national contexts. This trend is evident not only in formal parliamentary proceedings but also in the realm of social media interactions, underscoring its profound impact on the political landscape. The escalation of antagonistic discourses has led to a marked increase in the divide between groups with diametrically opposed viewpoints, a phenomenon that is often exacerbated by disinformation mechanisms and informational bubbles. The political landscape, once characterized by the use of dialogue and negotiation, transitioned to a model of confrontation. The empirical perception of an increase in polarization has been methodologically diagnosed in several scientific papers. A research study based on data extracted from the group of rounds from 2002 to 2018 of the Brazilian Electoral Study (ESEB) affirms that there is an increase in affective polarization in Brazil. This intensification of affective polarization became more pronounced in relation to leaders with clearer outlines as of 2018 (Fuks & Marques, 2022). In an environment characterized by political animosity, the identification of legislative actors who function as conduits between opposing ideological factions becomes a particularly salient issue. Deputies who possess the capacity to navigate between polarized groups often serve as consensus builders, a role that is particularly essential in the context of legislative proposals that face challenges due to a lack of cross-party cooperation. The application of a moderate influence in the context of debates has the potential to facilitate the emergence of dialogue, even in the presence of significant political fragmentation. It has been posited that the recognition of these profiles may serve to enhance democratic deliberation and facilitate the overcoming of institutional impediments. Therefore, ascertaining the identity of these deputies emerges as a viable strategy to enhance the effectiveness and representation of the legislative process. Once identified, these individuals will be the primary targets in the effort to make the necessary talks viable.

The Brazilian legislative power offers a particularly fertile environment for this type of investigation, given its party plurality and the recurrent ideological fragmentation between deputies. According to Oliveira (2023), Brazil has been identified as the second most politically unstable nation, a typical case of high political fragmentation characterized by an absurd number of effective parties in its system. The legislative dynamics in Brazil are characterized by unstable coalitions, complex negotiations, and frequent reconfigurations in political alliances. This environment renders the actions of deputies capable of transiting between different ideological spectra even more challenging—as well as crucial. The Brazilian Legislative Branch can be regarded not only as an object of analysis but also as a strategic field of study to understand political mediation in polarized democracies. In this polarized fragmentation scenario, the deputies must act in concert to achieve a desired political objective, such as the approval of a law. To this end, they articulate, gather votes, persuade each other to vote, collaborate, and act as a cohesive group. This characterization enables the classification of this group of actors and their connections as an ideal raw material for social media analysis, the materialization of which may be implemented by the mathematical instrument known as a *graph*. Robins (2015) delineates a set of six compelling reasons for the incorporation of networks in the realm of social science research. Two of them, in particular, are the reasons that led to the selection of this theoretical basis for this study:

- **First reason:** The researcher wishes to study how individuals affect social structure.

- **Second reason:** If the individuals in certain social positions have different individual results.

The primary rationale pertains to the investigative scope of this study, as it is imperative to comprehend the legislative social structure and its interaction with the individual conduct of deputies to achieve the stipulated objective. The second reason is also pertinent, as it is of interest for the research to ascertain whether deputies occupying certain positions in the network are actors with the potential to collaborate in obtaining greater consensus. The objective of this study is to propose a methodology, grounded in social media analysis techniques, to identify deputies who serve as mediators between disparate ideological factions in the Brazilian Legislative Branch. The objective is to model parliamentary interactions as a network represented by a weighted, undirected graph. The purpose is to highlight actors whose structural positions turn them into individuals capable of establishing connections between distinct ideological communities. The utilization of enduring agreements predicated on votes has enabled the development of metrics that comprehensively gauge the capacity of intermediation and articulation among polarized groups. This analytical contribution aims to foster a more profound comprehension of public dynamics and identify potential cooperation agents in contexts marked by high fragmentation.

While the empirical focus of this study is the Brazilian Legislative Branch, the methodology adopted is of a general nature, allowing for application to any legislative system of democratic countries in which parliament maintains autonomy in the execution of its legislative functions. The proposed methods are not contingent upon specific institutional particularities, thereby enabling their adaptation to diverse national contexts. The analytical possibility is, therefore, valid in multiple representative democracies. The objective of this study is twofold: first, to understand a national reality, and second, to offer a methodological replicable tool to different nations.

1.1 Review of literature

To identify the deputies who intermediate dialogues, it is necessary to understand them while also recognizing the network actors that facilitate the flow of information between opposing groups. In the context of social media analysis, these actors are often identified through a specific metric: bridge centrality. This index quantifies the frequency with which an actor serves as an intermediary in the communication between other actors. It has been demonstrated that the extent to which an actor occupies a central position in the network of relationships among their peers is directly proportional to their influence in facilitating dialogue. First and foremost, it is necessary to establish the formal-theoretical basis of the bridge centrality metric. To that end, the following more basic concepts must be presented: degree of a node, betweenness centrality, and bridge coefficient. These concepts will be scrutinized as follows. One of the most essential concepts in graph theory, the degree of a node, is employed to calculate other metrics of a more complex nature. As elucidated by Caldarelli (2007), the degree of a node is defined as the quantity of edges connected to it. It is further clarified that the sum of all the degrees in a graph is equivalent to the number of its edges multiplied by two. This phenomenon occurs because each bond contributes twice in the degree counting process. Specifically, each bond contributes one unit for each of the vertices to which it connects. Given an adjacency matrix $A(n,n)$, the degree can be calculated through Equation (1).

Equation 1

$$d_i = \sum_{j=1,n} a_{i,j}$$

In turn, betweenness centrality is a measure of the global importance of a node that assesses the proportion of the shortest paths between all pairs of nodes that pass through the node of interest. According to Newman (2010), considering as the number of shorter paths between the vertices s and t that go through v and considering gst as the total number of shorter paths from s to t, the betweenness centrality CB of the v node in a general network is expressed by Equation (2).

Equation 2

$$C_B(v) = \sum_{st} \frac{n_{st}^{v}}{g_{st}}$$

The mathematical model under consideration posits that between two nodes ***s*** and ***t***, there may exist multiple paths of equal length, in addition to the single shortest path. In essence, the betweenness centrality of a node is the ratio of all shorter paths passing through that node. Hwang et al. (2006) have presented a semantic parallel that is intended to facilitate comprehension of the bridge coefficient. In the aforementioned article, the authors present a network as a simple electric circuit in which electrical current bottlenecks occur at the shorter degree edges. This phenomenon can be attributed to the reduced number of bonds in these nodes, resulting in a lower frequency of exits compared to higher-degree nodes. If the increase of a degree opens pathways for the flow, then its inverse would be some sort of "resistance," an obstacle to the course of information. Therefore, the bridge coefficient can be regarded as the underlying factor contributing to the observed resistance of a node to the sum of its neighbors' resistance. These regions, distinguished by their distinctiveness and dense connectivity, are linked by high-degree vertices, thereby facilitating the dissemination of information among groups. The bridge coefficient calculation ***BC*** of a ***v*** node is defined by Hwang et al. (2006) according to Equation (3).

Equation 3

$$B_c(v) = \frac{d(v)^{-1}}{\sum_{i \in N(v)} \frac{1}{d(i)}}$$

where ***d(v)–1*** is the inverse of the degree of node ***v***, and ***N(v)*** is the set of neighbors of node ***v***.

It is evident that each of the components of the aforementioned trio of metrics possesses characteristics that delineate them as either local or global. While the "bridge degree" and "coefficient" are metrics local to the node, the "betweenness centrality" exhibits a more global relationship with the node. These characteristics support the hypothesis that the research's exploratory intention would be met by the deputies who serve as a bridge between different political communities within the Legislative Branch. Therefore, the research should not consider only the individual characteristics or the close political surrounding's characteristics, but also the global ones, from the political network to which it belongs. To reunite both characteristics, the most adequate procedure was to adopt the metric named by the literature as "bridge centrality," whose value may characterize a vertex as a bridge node: a graph vertex situated between modules (or groups) that connect densely connected components. The value of this metric is obtained by multiplying the betweenness centrality by the bridge coefficient. This calculation considers both local characteristics stemming from the bridge coefficient and related to the node degree in relation to its neighbors, as well as global characteristics stemming from the betweenness centrality, which considers paths in a general manner. Specifically, the bridge centrality $C_p(v)$ for the node of interest v is defined by Equation (4).

Equation 4 $$C_p(v) = C_b(v) \times B_c(v)$$

2 METHODOLOGY

The research was conducted using a mixed approach, incorporating methods from both quantitative and qualitative perspectives in a non-exclusionary, complementary manner. Consequently, both numeric and descriptive data were utilized to provide a more comprehensive understanding of the phenomenon under study. The initial stage entailed data collection, mathematical formulation, and network creation. An exclusion criterion was devised for circumstantial concordances, and the bridge centrality calculation was executed. Finally, the deputies who exhibited the highest values for this metric were identified as the primary dialoguing actors of the House of Representatives for the year 2022, a year that was adopted by convention.

2.1 Data collection

To conduct the studies, the research team obtained the open data of the House of Representatives from the aforementioned institution's website (Câmara dos Deputados, 2023). The data were available in groups named thematic collections. However, only components of these records have been utilized in the research, namely deputies, ballots, and votes. A deputy is a representative elected by the people to exercise legislative mandate in a parliament, with the function of proposing, debating, and voting laws. The House of Representatives has a predetermined schedule that includes the matter of voting. As a formal procedure integral to the functions of the Legislative Branch, it is a process through which congressmen formally articulate their positions on various legislative proposals, including bills (law projects), amendments, and parliamentary motions. This event functions as a deliberative and decision-making mechanism within the scope of the branch. In the legislative context, voting signifies the individual expression of the parliament, which is executed during the act of casting a vote. This act is political and deliberative in nature, signifying agreement, disagreement, or abstention regarding a particular matter. Each vote contributes to the formation of the collective result of voting and reflects ideological, partisan, or strategic positioning. For the purposes of this research, a temporal window of one voting year and votes has been selected for the application of the data. The selected year was 2022. The data obtained are listed in Table 1.

Table 1. List of data used in the research and URL for obtaining said data. **Note**. Drafted by the authors.

Data description	Source of data acquisition
Table of deputies	*https://dadosabertos.camara.leg.br/arquivos/deputados/xlsx/deputados.xlsx*
Votes (year: 2022)	*https://dadosabertos.camara.leg.br/arquivos/votacoes/xlsx/votacoes-2022.xlsx*
Voting table (year: 2022)	*https://dadosabertos.camara.leg.br/arquivos/votacoesVotos/xlsx/votacoesVotos-2022.xlsx*

The concordance network under scrutiny in this study has been methodologically constructed using the three data sources presented above, as demonstrated in the following formalizations.

2.2 Mathematical formalization of the concordance network

From a methodological perspective, the establishment of a legislative social network, represented by a graph, necessitated the prior establishment of rules that govern the creation of vertices and edges. Each deputy has been represented by a vertex containing minimal data, such as a unique identification, name, and party affiliation. With respect to the edges' structures, their creation expressed the strength of concordance between two deputies (vertices). Upon participating in voting and sharing opinions through their votes, concerning any matter and intending to approve it (through "yes") or reject it (through "no"), those two congressmen may agree (through similar votes) or disagree (through different votes). The magnitude of the edge bonding between any two ***A*** and ***B*** deputies is directly proportional to the number of agreeing votes between them, as this results in greater proximity and interconnectedness between the deputies. This definition is part of the methodological conventions and seeks to contribute to the identification of the communities through metrics in later stages. Given that for each pair of identical votes of agreeing deputies, the edge that unites them receives the sum of one concordance unit (+1), the configuration necessitates the implementation of a weighted graph, with the weight attribute obligatorily linked to the edges. Furthermore, given that concordance is mutual and has no direction, the ideal graph is also undirected. The network structure can be formalized with support from Set Theory. Let D be the set of deputies, defined as: $D = \{d_1, d_2, d_3, \ldots, d_n\}$. Let V be the set of votings: $V = \{v_1, v_2, v_3, \ldots, v_n\}$. Let R be the set of votes, where each element is a triple $(d_i, v_n, vote)$, representing that the deputy d_i has voted in voting v_n. To consider the similarity between votes, we need to form unordered pairs of different deputies. Formally, the set of unordered pairs $\{d_i, d_j\}$, where $d_i \neq d_j$, is defined as Equation (5).

Equation 5 $$D' = \{ \{ d_i, d_j \} \mid d_i , d_j \in D \text{ and } d_i \neq d_j \}$$

It is imperative to note that the set $\{d_i, d_j\}$ is being considered, and consequently, $\{d_i, d_j\} = \{d_j, d_i\}$. For each pair $\{d_i, d_j\} \in D'$, a similarity function, denoted by S, is defined as the cardinality of the set. That is to say, $\boldsymbol{S}$ is the number of times that $\boldsymbol{d_i}$ and $\boldsymbol{d_j}$ both voted the same way in a given vote, as illustrated in Equation (6).

Equation 6 $$S(d_i , d_j) = | \{v \in V \mid (d_i , v, vote_i) \in R \text{ and } (dj, v , vote_j) \in R \;/\; vote_i = vote_j\}|$$

The resultant set of triples is expressed in the following format: $\boldsymbol{(d_i, d_j, w)}$, where $\boldsymbol{w}$ denotes the value of similarity $\boldsymbol{S(d_i, d_j)}$. Given the unordered nature of the pairs, each pair is represented only once according to Equation (7).

Equation 7 $$T = \{ (d_i , d_j ,S (d_i , d_j)) \;/\; \{ d_i , d_j \} \in D' \}$$

2.3 Circumstantial concordances versus persistent concordances

Following the establishment of the criteria for constructing the concordance network, it is imperative to prioritize resilient and enduring concordances over circumstantial ones in the analysis. This is due to the fact that only the former allow for the representation of ideological or behavioral bonds among agents with greater accuracy and stability over time. Momentary concordances, motivated by conjunctive factors or short-term specific interests, have the potential to distort the network's real structure by suggesting connections that do not reflect consistent alignments. A network created based on persistent concordances may reveal more robust patterns of cohesion and opposition, facilitating the identification of ideological communities and, consequently, the political actors that bond them with more analytical precision and longitudinal validity. In the parliamentary environment, the ideological alignment that endures is rooted in the consistent voting patterns exhibited over time. Therefore, given the configuration of the social network under consideration, the edges that exhibit higher relevance are those that have been assigned a greater weight than usual. These edges correspond to pairs of deputies who demonstrate consistent agreement, as opposed to sporadic agreement. Conversely, when the weight is minimal, the exhibited bonds by the measured edges that bind the congressmen may have been attributable to transitional factors. The approach adopted in this study involves a simplification of the network, thereby facilitating the representation and interpretation of the most significant interactions during the visual and preliminary exploratory analyses. The rationale behind this phenomenon is that the social media presence of congressmen may be intricate, characterized by numerous nodes and edges, which can impede the identification of pictorial patterns. By emphasizing stronger connections, the visual representation of the resulting network becomes clearer and sparser, highlighting the cohesive groups formed within the parliament.

To maintain only the non-circumstantial concordances, the research has opted to preserve only the bonds with weight above the median. This will result in a network that emphasizes the strongly cohesive groups, offering a clearer and more objective view of the support relationships between pairs of deputies with similar ideological affinities. The maintenance of these stronger connections can be formulated mathematically as follows: suppose that D is the set of all the deputies represented in the network by vertices and that E is the set of edges, where each edge $e(d_i, d_j)$ connects a pair of deputies d_i and d_j. The weight $w(e)$ of each set is defined as the sum of the concordance units between the deputies who are connected by the edge. Let be the median of the weight values $w(e)$ for all edges in the set E. Accordingly, we define the subgraph G as the set of all vertices D and edges E', where the weight of each edge e' is greater than according to Equation (8).

Equation 8 $$G = \{ e \rightarrow E \mid w(e) > W_{median} \}$$

3 RESULTS

3.1 *General characterization of the network built based on the methodology*

As delineated in the methodology, only enduring and non-circumstantial concordances have been retained. The median of the edge weights was subsequently calculated, and the edges with a lower or equal median weight were excluded. As illustrated in Table 2, the median value, the quantity of excluded edges, and the number of edges that remained subsequent to the exclusion of circumstantial concordances are indicated.

Table 2. Number of edges and vertices after the exclusion of circumstantial concordances. **Note**. Based on data from the House of Representatives, processed by the authors.

Edges	Vertices	Median of weights (agreements)	Edges after deletion	Vertices after deletion
152,464	554	153	75,854	501

3.2 *Plotting the network as a graph*

The network plotting algorithm employed a directed force that was oriented in opposition to the plotting space communities that were ideologically opposed. Finally, the side and color of the vertices have been linked to the "bridge centrality." As demonstrated in Figure 1, larger and more pronounced vertices possess a higher metric value.

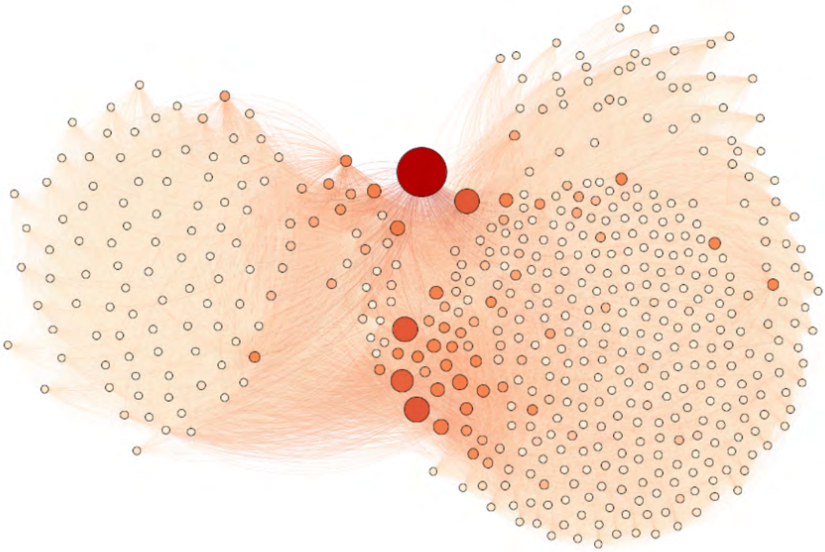

Figure 1. Plotting of the concordance network prepared following the methodology. **Note**. Drafted by the authors.

3.3 Descriptive statistics of the network's metrics

As illustrated in Table 3, the measures of centrality and dispersion have been calculated for the nodes of the congressmen's social network. This offers a statistical characterization of the metrics network's distributions. The following central tendency values are included: the average and the median. The following dispersion values are included: the standard deviation, the first and third quartiles. The following forms are included: the asymmetry and the kurtosis for the betweenness centrality, the bridge coefficient, and the bridge centrality.

Table 3. Measures of centrality and dispersion of the congressmen's vertices. **Note**. Drafted by the authors

	Betweenness centrality	Bridge coefficient	Bridge centrality
Average	9.86275E-04	4.2986E-03	4.28418E-06
Median	2.4048E-04	4.1901E-03	1.0162E-06
Standard deviation	3.4901E-03	1.6735E-03	1.44275E-05
Minimum	0	2.3360E-05	0
Maximum	6.2152E-02	1.1556E-02	2.3662E-04
First quartile	8.81764E-05	3.2124E-03	3.2020E-07
Third quartile	6.7468E-04	5.4053E-03	2.8325E-06
Asymmetry	12.4510	2.4778E-01	10.5183
Kurtosis	197.0113	1.023463238	145.3964

3.4 Distribution of the centrality metrics

The graphical analysis of centrality facilitates the identification of the distribution of values among congressmen and the reflection of network structural imbalances. For each metric, a histogram is presented, which shows the density of the frequency of values. A boxplot is also presented, which evidences medians, quartiles, and outliers. The histogram of the bridge coefficient reveals a relatively symmetric distribution, with slight positive asymmetry, as illustrated in Figure 2.

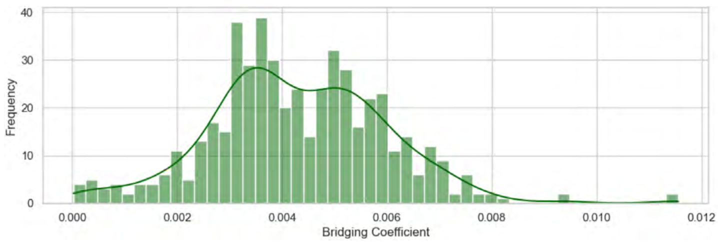

Figure 2. Distribution of frequency of the bridging coefficient. **Note**. Drafted by the authors.

The majority of the congressmen present exhibited values that approximate the mean, suggesting a less pronounced concentration of data in extremes. The boxplot graphic of the bridge coefficient confirms the presence of a moderate dispersion pattern, exhibiting minimal outliers, as illustrated in Figure 3.

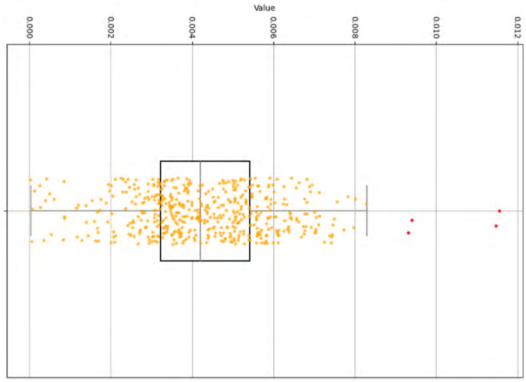

Figure 3. Boxplot of the bridging coefficient. **Note**. Drafted by the authors.

The linear scale employed in Figure 3 is adequate for effectively depicting the distribution, thereby reinforcing the homogeneity associated with this metric. Conversely, the histogram of betweenness centrality demonstrates pronounced asymmetry toward the right, with the majority of values concentrated around zero and only a few instances exhibiting notably high values, as illustrated in Figure 4.

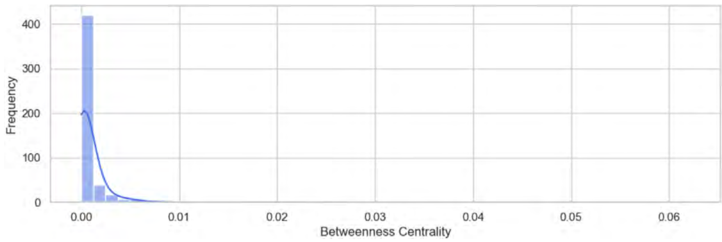

Figure 4. Distribution of betweenness centrality.
Note. Drafted by the authors.

This finding suggests that a significant proportion of congressmen do not occupy intermediary positions within the network. The betweenness centrality boxplot, with logarithmic scale, highlights a significant number of outliers above the third quartile, thereby reinforcing the concentration of the global centrality in a limited number of nodes. The utilization of a logarithmic scale for enhanced visualization is substantiated by the dispersed distribution, as illustrated in Figure 5.

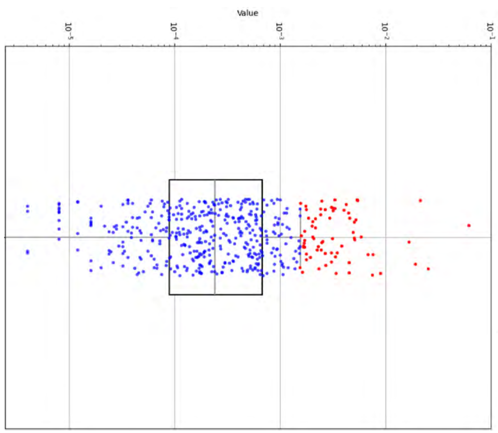

Figure 5. Distribution of the betweenness centrality.
Note. Drafted by the authors.

The distribution of bridging centrality exhibits a resemblance to the betweenness distribution, manifesting an accentuated asymmetry. The values are notably concentrated close to zero, with few congressmen assuming very high values, as illustrated by Figure 6.

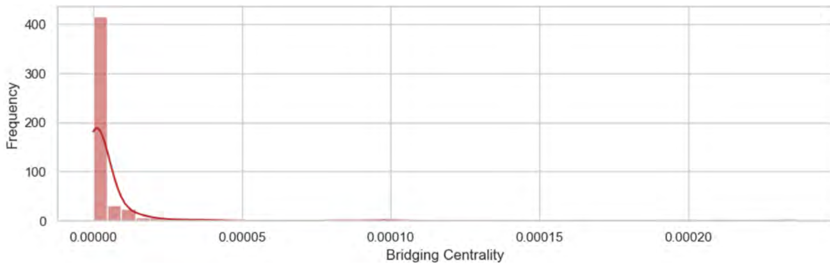

Figure 6. Distribution of bridging centrality.
Note. Drafted by the authors.

3.5 *Congressmen with greater bridge centrality*

The results pertaining to the congressmen with greater bridge centrality are presented through their respective unique identifiers, as opposed to their names, as illustrated in Table 4.

Table 4. Congressmen with greater bridge centrality.
Note. Drafted by the authors.

Unique identifier of the parliamentarian	Bridge centrality
204433	2.3662E-04
74467	1.0051E-04
204466	9.7352E-05
204357	9.4965E-05

Unique identifier of the parliamentarian	Bridge centrality
160976	8.2423E-05
74471	4.3305E-05
74075	4.0648E-05
73460	3.9109E-05
90201	3.4778E-05
177282	3.3930E-05

The decision to omit the congressmen's names, replacing them with identifiers in Table 4, aims to redirect the analysis's emphasis toward the concordance network structural properties and the centrality metrics themselves. This approach serves to mitigate potential interpretation biases that might arise from immediate association with political figures. The analysis prioritized neutrality and objectivity, with the objective of facilitating the reader's comprehension of the network's patterns of interconnection and influence, unencumbered by preconceived notions about the individuals involved. Readers interested in identifying the congressmen corresponding to the identifiers may find the names associated with the aforementioned identifiers in an external repository. The comprehensive dataset pertaining to the parliamentary social network, encompassing the congressmen's identification numbers and their respective connections, is accessible to the public for download and reproduction. The vertices and edges files, which are sufficient for reproducing the social network, have been published in .csv format (tabular data separated by commas) and placed in the Zenodo repository. They can be accessed through the following DOI: *https://doi.org/10.5281/zenodo.15791268*.

4 DISCUSSION

The results obtained point to a significant inequality in the distribution of structural positions among the congressmen of the legislative concordance network. The betweenness and bridge centrality metrics manifest strongly asymmetric distributions, with a substantial concentration of values near zero and the presence of outliers that are orders of magnitude greater. This pattern, characterized by elevated values of the high asymmetry index (12.45 and 10.52, respectively) and an extremely elevated kurtosis (197.01 and 145.39), supports the hypothesis that most congressmen occupy peripheral positions in the network, while a small number of individuals concentrate strategic connection roles. These values suggest not only a pronounced rightward skew in distributions but also a heightened density of values proximate to the mean, accompanied by more pronounced peaks. This phenomenon indicates the existence of a conspicuously influential structural elite. The betweenness centrality, by definition, considers the number of times a node acts as a bridge in geodesic paths among all the peers in the network. The global nature of the metric renders it particularly sensitive to the wide network structure, thereby justifying the strong asymmetry observed. A paucity of nodes has been observed that structurally bond communities or densely connected regions. The significant disparity between the mean (≈9.86 × 10-4) and the median (≈2.40 × 10-4) substantiates the presence of bias. Concurrently, the remarkably elevated kurtosis (197.01) indicates an exceptionally concentrated distribution, with pronounced peaks of atypical values, around the lower end of the spectrum. These findings suggest that the field of political network studies is characterized by the presence of influential minorities who possess high levels of articulation power.

In contrast, the bridge coefficient exhibited a considerably more symmetrical distribution (asymmetry of only 0.25) and a flatter distribution (kurtosis ≈1.02), suggesting a more homogeneous metric that is less influenced by extreme values. As it is a local metric, it evaluates if the direct connections of a node distribute themselves throughout different communities. Therefore, even congressmen who do not facilitate interactions on a global scale may exhibit moderate bridge coefficients if they establish bonds outside of their own blocs. This phenomenon elucidates the reduced dispersion, the approximation between the mean and the median, and the minimal presence of outliers. Consequently, the bridging centrality, which is derived from the weighted sum of its betweenness centrality and bridging coefficient, synthesizes both local and global aspects of the network. The distribution exhibited a high degree of asymmetry (10.52) and a pronounced kurtosis (145.39), suggesting a significant influence of the global component on the metric. This finding indicates that, despite the limited number of congressmen who exhibit both high intermediation and intercommunity connections, this combination is functionally significant in identifying actors with the capacity to facilitate cross-cutting connections in contexts characterized by fragmentation and political polarization. In summary, the statistical and topological patterns observed indicate that the legislative concordance network is strongly hierarchized, with a limited number of congressmen occupying structural positions of intercommunity influence. The bridge centrality metric has been demonstrated to be an especially effective tool for identifying these actors, as it integrates both local and global structure dimensions. This ascertainment is pertinent to the comprehension of the parliament's internal dynamics and the development of replicable analytic methodologies that support studies about governability, consensus, and the formation of coalitions. The ensuing sections explore these implications in greater detail.

5 CONCLUSION

This study proposed a technical–analytical approach for the identification of congressmen with potential for intercommunity articulation in polarized legislative contexts. This approach entailed the modeling of social networks based on the concordances of votes. The utilization of conventional metrics (betweenness centrality) and derived metrics (bridge coefficient and centrality) permitted the isolation of structural attributes that differentiate peripheral positions of nodes occupying positions of strategic connection. From a methodological perspective, the combined utilization of global and local scope metrics was considered sufficient to characterize the congressmen with greater precision. These congressmen not only maintain bonds with different communities but also play a critical role in mediating the flow of decisions. The bridge centrality, upon synthesizing these dimensions, offers a composite metric that avoids the limits of unidimensional approaches and amplifies the sensitivity of structural analysis in political networks. Empirical evidence has demonstrated that the asymmetry in the distribution of these metrics can be effectively diagnosed through the utilization of histograms and boxplots with a logarithmic scale. This approach enhances the interpretability of hierarchical structures and patterns of influence concentration. The implementation of these procedures in parliamentary networks enables the deduction of institutional positions based on empirically observed connectivity patterns and intermediation. This study offers a methodological contribution to the field of computational legislative analysis by proposing a replicable manner of localizing, from a network structure, the agents with greater potential of promoting ideological crossings. This identification is of particular pertinence for studies of governability, coalitions, and conflict mediation in multiparty decision environments.

Conflict of interest

The authors declare that they have no conflict of interest.

Contribution statement

Manoel Camilo de Sousa Netto: Writing – Review & Editing, Writing – Original Draft, Methodology, Conceptualization.
Adilson Luiz Pinto: Writing – Review & Editing, Supervision.

Statement of data consent

This study generated vertex and edge data stored in the Zenodo repository: *https://doi.org/10.5281/zenodo.15791268*. The data used in this study are open and publicly available, and individual consent is not required for their use. The collection, processing, and analysis of these data were carried out in strict compliance with the General Data Protection Law (LGPD), Law No. 13,709/2018, and the Access to Information Law (LAI), Law No. 12,527/2011, ensuring legality and transparency in the use of information.

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